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[54] **COMPOSITIONS FOR USE IN EMBOLIZING BLOOD VESSELS**

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[56] **References Cited**

U.S. PATENT DOCUMENTS

4,079,124	3/1978	Winchell	424/4
4,631,188	12/1986	Stoy et al.	424/81
4,795,741	1/1989	Leshchiner et al.	514/21
4,938,763	7/1990	Dunn et al.	604/891.1
5,202,352	4/1993	Okada et al.	514/475
5,443,454	8/1995	Tanabe et al.	604/264
B1 4,938,763	7/1995	Dunn et al.	604/891.1

FOREIGN PATENT DOCUMENTS

5-57014	3/1993	Japan
5-253283	10/1993	Japan
6-107549	4/1994	Japan

OTHER PUBLICATIONS

Toxicology, Amdur et al., Editors, *Toxic Effects of Metals*, 4th Edition, pp. 661-664, Pergamon Press, New York, New York.

Guglielmi, et al., *Electrothrombosis of Saccular Aneurysms via Endovascular Approach*, J. Neurosurg., 75:8-14 (1991).

Kinugasa, et al., *Early Treatment of Subarachnoid Hemorrhage After Preventing Rerupture of an Aneurysm*, J. Neurosurg., 83:34-41 (1995).

Kinugasa, et al., *Prophylactic Thrombosis to Prevent New Bleeding and to Delay Aneurysm Surgery*, Neurosurgery, 36(4):661-667 (1995).

Kinugasa, et al., *Direct Thrombosis of a Pseudoaneurysm after Obliteration of a Carotid-Cavernous Fistula with Cellulose Acetate Polymer: Technical Case Report*, Neurosurgery, 35(4):755-760 (1994).

Kinugasa, et al., *Direct Thrombosis of Aneurysms with Cellulose Acetate Polymer, Part II: Preliminary Clinical Experience*, J. Neurosurg., 77:501-507 (1992).

Mandai, et al., *Direct Thrombosis of Aneurysms with Cellulose Acetate Polymer, Part I: Results on Thrombosis in Experimental Aneurysms*, J. Neurosurg., 77:497-500 (1992).

Miyatake, et al., *Cobb's Syndrome and its Treatment with Embolization*, J. Neurosurg., 72:497-499 (1990).

Sadato, et al., *Experimental Study and Clinical Use of Poly(vinyl acetate) Emulsion as Liquid Embolisation Material*, Neuroradiology, 36:634-641 (1994).

Sugiu, et al., *Direct Thrombosis of Experimental Aneurysms with Cellulose Acetate Polymer (CAP): Technical Aspects, Angiographic Follow Up, and Histological Study*, J. Neurosurg., 83:531-538 (1995).

Taki, et al., *A New Liquid Material for Embolization of Arteriovenous Malformatoins*, Am. J. Neuroradiology, 11:163-168 (1990).

Taki, et al., *Selection and Combination of Various Endovascular Techniques in the Treatment of Giant Aneurysms*, J. Neurosurg., 77:37-42 (1992).

Terada, et al., *Embolization of Arteriovenous Malformations with Peripheral Aneurysms using Ethylene Vinyl Alcohol Copolymer*, J. Neurosurg., 75:655-660 (1991).

Yamashita, et al., *Characteristics of Ethylene Vinyl Alcohol Copolymer (EVAL) Mixtures*, Am. J. Neuroradiology, 15:1103-1105 (1994).

Medical Tribune, "Possibility and Limit of Intravascular Surgery", Taki, Oct. 26, 1989, pp. 46-47.

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[57] **ABSTRACT**

Disclosed are compositions suitable for use in embolizing blood vessels which compositions comprise an ethylene vinyl alcohol copolymer, a biocompatible solvent and a water insoluble contrasting agent selected from the group consisting of tantalum, tantalum oxide and barium sulfate. Also disclosed are methods for embolizing a blood vessel using the compositions described herein.

15 Claims, No Drawings